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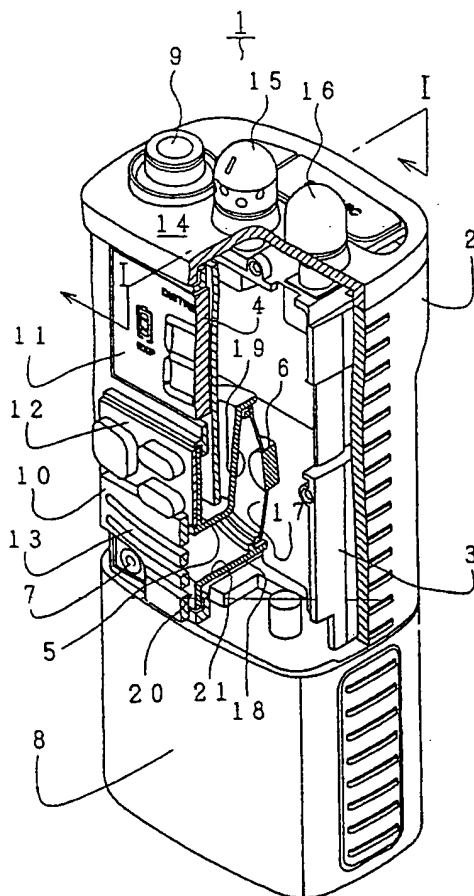
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: APPARATUS WITH A BUILT-IN SPEAKER



(57) Abstract: An object of the invention is to make more compact as a whole and particularly in its front face an apparatus with a built-in speaker, said apparatus having a display means, an operation means and a speaker grill which are provided on the front face of the apparatus body, without reducing the size of the display panel of said display means and the size of the operator panel of said operation means and without deteriorating the tone quality of the built-in speaker. An apparatus of the invention has a speaker (6) to be built in the apparatus body (2), said speaker (6) being provided at the back of at least one of a display panel (4) and an operator panel (5), and has a voice path (18) for guiding a voice outputted from the speaker (5) to a speaker grill (13).

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Apparatus with a Built-in Speaker

The present invention relates to an apparatus with a built-in speaker in which a speaker to output a voice is built, and more particularly, to an apparatus with a built-in speaker having an entirely compact size.

Conventionally, in a speaker built-in apparatus 1a, having a display panel, an operator panel and a speaker grille on the same surface of the apparatus body, e.g., a front face, display means 4a, operation means 5a and a speaker 6a are provided in an apparatus body 2a as shown in Fig. 3. That is, in the speaker built-in apparatus 1a, the display means 4a, the operation means 5a and the speaker 6a are provided on approximately the same surface.

In the conventional speaker built-in apparatus 1a, as the display means 4a, the operation means 5a and the speaker 6a are provided on approximately the same surface, the size of a front face 10a is determined based on the sizes of these means, and the apparatus body 2a cannot become compact.

Especially, with today's needs for multiple functions in the apparatus, the operation means 5a increases in size, to increase the area of the operator panel 12. Further, the area of a display panel 11a of the display means 4a must be increased to increase the number of display items for readability. In addition, it is more advantageous to obtain a high quality voice output as the speaker 6a is larger. Accordingly, the size of the front face 10a tends to increase, and the problem is more serious.

The present invention has been made in view of the above-described problem, and provides an apparatus with a built-in speaker in which the sizes of the display panel and the operator panel can be ensured without being reduced, and the quality of output voice from the built-in speaker is not degraded

In order to obtain this object the present invention provides an apparatus with a built-in speaker having a speaker provided in the rear of at least one of a display panel and an operator panel, and a voice path to guide a voice from the speaker to a speaker grille.

The detailed construction of the apparatus is an apparatus with a built-in speaker which comprises a display means having a display panel, an operation means having an operator panel and a speaker for outputting a voice through a speaker grille, and which has

said display panel, said operator panel and said speaker grille provided on the same face of the apparatus body, wherein; a speaker is provided at the back of at least one of said display means and said operation means, and a voice path connecting the output face of said speaker to said speaker grill is provided.

5 That is, in the speaker built-in apparatus, the area for providing the speaker is moved to the rear of at least one of the display means and the operation means, and by this movement, the area of the surface where the display means and the operation means are provided can be reduced.

10 The entire apparatus can be downsized, especially, a compact front face can be attained.

 Hereinbelow, an embodiment of the present invention will be described in detail by way of example with reference to Figs. 1 and 2. The embodiment does not pose any limitation on the present invention.

15 Fig. 1 is a partially-cutaway entire perspective view showing the structure of the embodiment of the present invention.

 Fig. 2 is a partially-cutaway I-I cross-sectional view of the embodiment in Fig. 1.

 Fig. 3 is a diagram corresponding to Fig. 1, showing the conventional technique to the present invention.

20 A transceiver 1 as a speaker built-in apparatus has a casing 2 forming the apparatus body, a circuit board (not shown), a chassis 3 holding the circuit board, display means 4, operation means 5, a speaker 6, a microphone 7, power supply means 8 and an antenna support mount 9.

25 In the casing 2, the display panel 11 of the display means 4, the operator panel 12 of the operation means 5, the speaker grille 13 to pass a voice from the speaker 6 and output it to the outside the apparatus, and a microphone grille (not shown) to input a voice from the outside into the microphone 7, are provided on the front face 10. Furthermore, in the casing 2, the antenna support mount 9 and operation knobs 15 and 16 are provided on a top face 14.

30 The operation knob 15 is used for squelch operation for fine noise control, and the operation knob 16, for startup and turn-off of the apparatus and output control on a voice from the speaker 6.

 The chassis 3, fixed to the inside the casing 2, holds the above-mentioned circuit board and switches and the like (not shown).

The display means 4 displays a transmission/reception channel, a battery remaining amount of the power supply means 8, a transmission power amount, a scan mode and the like. The display means 4 has the display panel 11 to indicate display contents on its front surface and is provided on the casing 2 such that the display panel 11 is on the same surface as the front face 10 of the casing 2.

The operation means 5 is used for setting the transmission/reception channel, the scan mode, the power and the like. The operation means 5 is provided on the casing 2 such that the operator panel 12 is on the same surface as the front face 10 of the casing 2.

The speaker 6 converts a received audio signal into a voice and outputs it. A plate having a size to obtain a sufficiently high-quality voice is selected as a voice output plate 17. The speaker 6 is provided in the rear of the operation means 5, at an angle to the front face 10 of the casing 2.

On the other hand, the speaker grille 13 to pass a voice from the speaker 6 and outputs it to the outside the apparatus is formed in the same surface of the front face 10 of the casing 2.

The transceiver 1 has a voice path 18 to connect the voice output plate 17 of the speaker 6 to the speaker grille 13. The voice path 18 mainly has a sound collecting unit 19 having a size and a shape corresponding to the voice output plate 17 of the speaker 6, on one end, a voice emitting unit 20 having a size and a shape corresponding to the speaker grille 13, on the other end, and a sound transmitting tube 21, connecting the sound collecting unit 19 to the voice emitting unit 20, to transmit an output voice from the speaker 6 to the voice emitting unit 20.

The power supply means 8 supplies electric power necessary for the transceiver 1 when it functions. The power supply means 8 has a battery (not shown), a battery box (not shown) to accommodate the battery, a connection terminal (not shown) to supply the power of the battery to the casing 2 side, and the like.

The power supply means 8 is removably integral with a bottom surface of the casing 2.

The transceiver 1 has the construction as described above. Hereinbelow, the function of the transceiver 1 according to the present invention will be described.

A user operates the operation knobs 15 and 16 and the operation means 5, to start the transceiver 1. Next, the user sets the channel to receive a signal from a transmitting side.

When the transceiver 1 receives a signal from the transmitting side, the circuit processes the received signal and converts it to an audio signal, and sends it to the speaker 6. The speaker 6 receives the audio signal, converts it to a voice, and outputs it from the voice output plate 17.

5 The voice outputted from the voice output plate 17 of the speaker 6 is sent to the voice path 18. That is, the voice enters the sound collecting unit 19, passes through the sound transmitting tube 21, and is transmitted to the voice emitting unit 20.

 The voice reached the voice emitting unit 20 from the voice path 18 passes through the speaker grille 13 adjacent to the voice emitting unit 20 and moves to the outside
10 the casing 2.

 Then the user can receive the received content in voice form. At this time, as the speaker 6 has a size not to lose the quality of the voice, the user does not hear a quality-degraded voice.

 On the other hand, as only the display means 4, the operation means 5 and the
15 speaker grille 13 are provided on the front face 10 of the casing 2 and the area necessary for holding the speaker 6 is moved to the rear of the operation means 5, the area of the front face 10 is small.

 Accordingly, in the transceiver 1, as the area of the front face 10 can be suppressed to be small, the entire apparatus can be compact.

20 In the transceiver 1, the speaker 6 is provided in the rear of the operation means 5, however, it may be provided in the rear of the display means 4, otherwise, it may be positioned in the rear of the display means 4 to the operation means 5.

 In the transceiver 1, to avoid the reverberation of a voice from the speaker 6 in the voice path 18, the placement position of the speaker 6 and the shape of the voice path 18
25 are considered, however, it is preferable that they are arbitrarily selected in correspondence with the shape and size of the speaker 6, and the shape and diameter of the sound transmitting tube 21 of the voice path 18.

 Although the embodiment of the present invention is a transceiver, the invention is applicable to a receiver, a navigator and the like.

30 In the speaker built-in apparatus according to the present invention, the position of the speaker built in the apparatus body is in the rear of at least one of a display panel and the operator panel, and the voice path to guide a voice from the speaker to the speaker grille is provided. Accordingly, when the display means, the operation means and the speaker grille are provided on the same surface of the apparatus body, as the area of the

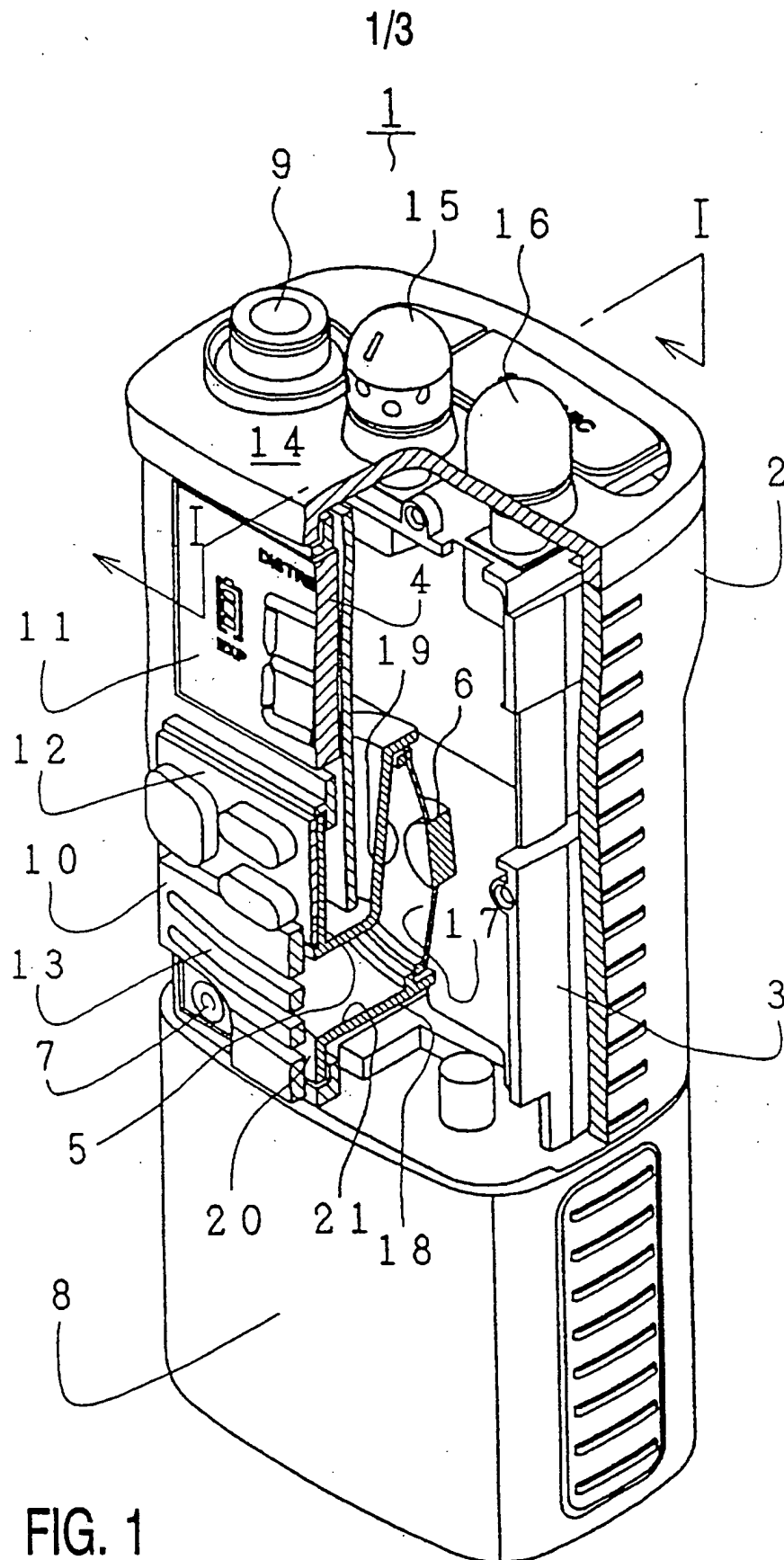
speaker does not influence the surface, the area of the surface can be suppressed to be small. As a result, the entire apparatus can be downsized. Further, as it is not necessary to reduce the speaker to a predetermined or smaller size, voice quality can be ensured.

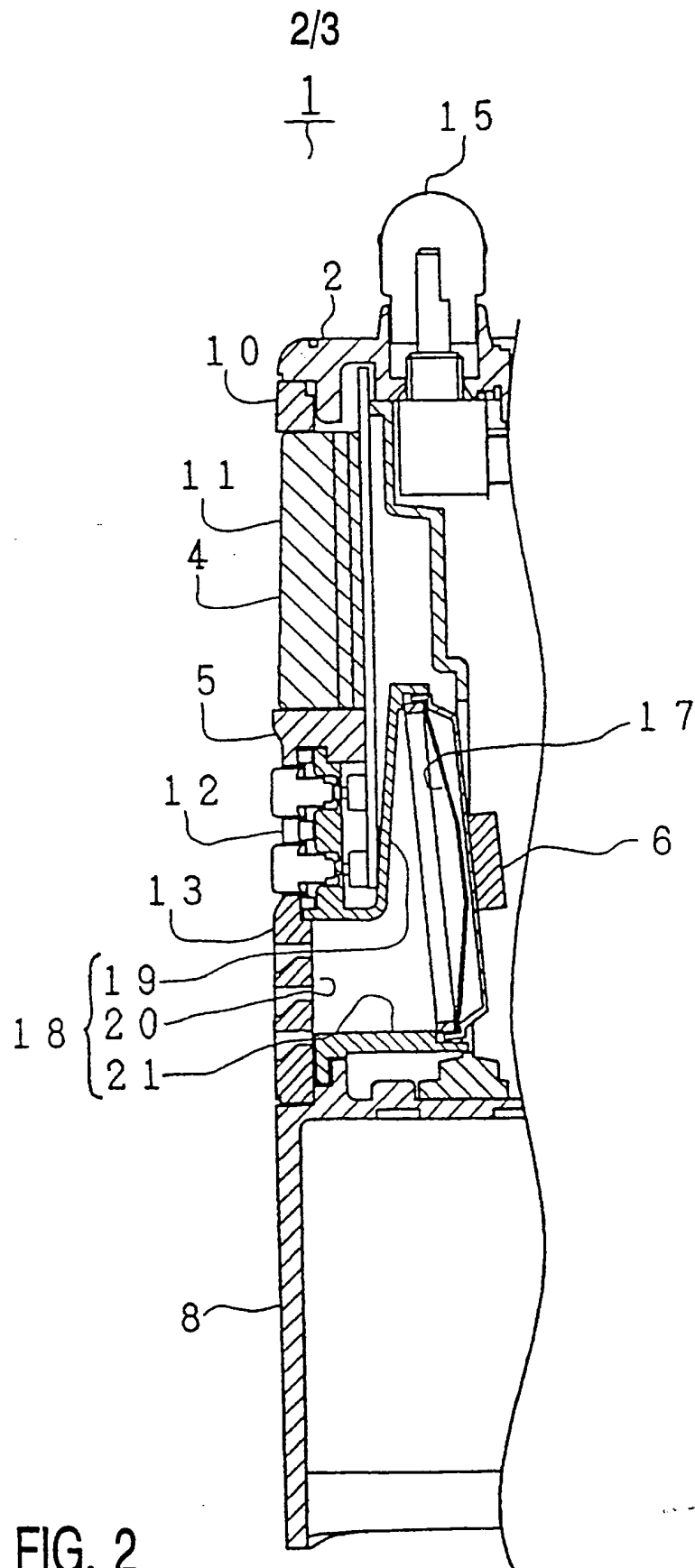
Reference Numerals

| | | |
|----|----|---|
| | 1 | Transceiver as speaker built-in apparatus |
| | 2 | Apparatus body |
| | 4 | Display means |
| 5 | 5 | Operation means |
| | 6 | Speaker |
| | 10 | Front face |
| | 11 | Display panel |
| | 12 | Operator panel |
| 10 | 13 | Speaker grille |
| | 18 | Voice path |
| | 19 | Sound collecting unit |
| | 20 | Voice emitting unit |
| | 21 | Sound transmitting tube |

CLAIM:

1. An apparatus with a built-in speaker which comprises a display means having a display panel, an operation means having an operator panel and a speaker for outputting a voice through a speaker grill, and which has said display panel, said operator panel and said speaker grill provided on the same face of the apparatus body, wherein; a speaker is provided
5 at the back of at least one of said display means and said operation means, and a voice path connecting the output face of said speaker to said speaker grill is provided.





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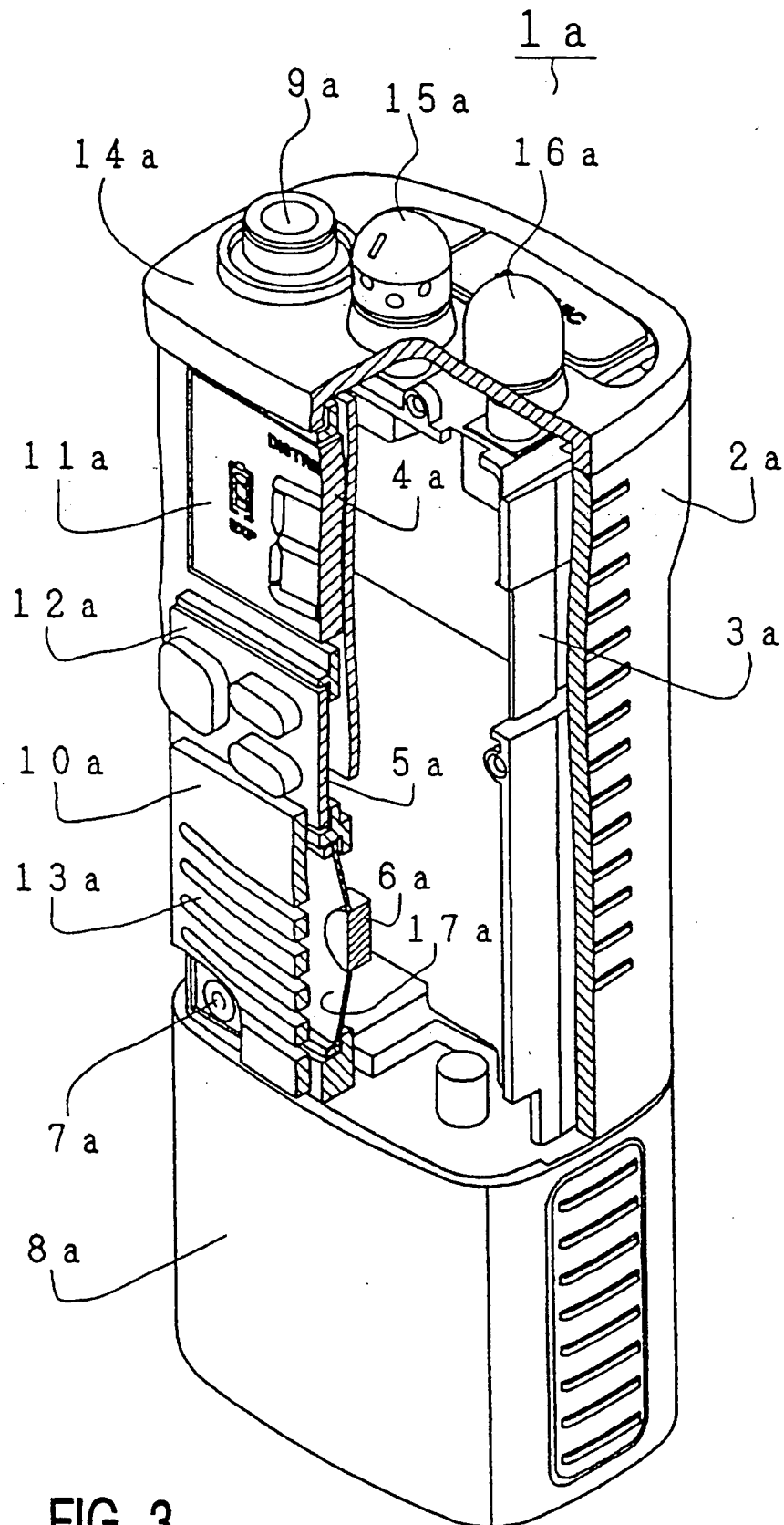


FIG. 3

INTERNATIONAL SEARCH REPORT

International Application No
PCT/EP 05889

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04B1/38 H04R1/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04B H04R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-----------------------|
| X | US 5 721 787 A (FINCH STEVEN J ET AL) 24 February 1998 (1998-02-24) abstract column 1, line 1 -column 3, line 18 figure 1 figure 3 | 1 |
| X | GB 2 310 559 A (NOKIA MOBILE PHONES LTD) 27 August 1997 (1997-08-27) abstract page 3, line 8 -page 4, line 22 page 6, line 26 -page 7, line 16 figure 1 figure 4 | 1 |

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

P 00/05889

| Patent document cited in search report | | Publication date | Patent family member(s) | Publication date |
|---|---|---------------------|----------------------------|---------------------|
| US 5721787 | A | 24-02-1998 | WO 9831192 A | 16-07-1998 |
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